given off from the thin, exogenous, Xylem zone which encloses the medulla, whilst at the same points the continuity of the Xylem ring is interrupted, as was also the case with the Dadoxylons, by an extension of the medullary cells into the primitive cortex. Sections of the petiolar bases of the leaf-scales of the bud show that these bundles enter each petiole in parallel pairs, subsequently subdividing and ramifying in the Adiantiform leaf. This curious resemblance between Salisburia and Dadoxylon, accompanied as it is by other resemblances in the structure of the wood, bark, and medulla, suggest the probability that our British Dadoxylon was a Carboniferous plant of Salisburian type, of which Trigonocarpum may well have been the fruit. If so, the further possibility suggests itself that this plant may have been the ancestral form whence sprang the Baieras of the Oolites, and, through them, the true Salisburias of Cretaceous and of recent times.

The Society adjourned over Ascension Day to Thursday, May 25.

May 25, 1882.

THE PRESIDENT in the Chair.

The Presents received were laid on the table and thanks ordered for them.

Mr. Bindon Blood Stoney was admitted into the Society.

The following Papers were read :—

I. "On certain Geometrical Theorems. No. 2." By W. H. L. Russell, F.R.S. Received May 10, 1882.

(4.) The following is a short method of determining the conic of 5 pointic-contact with a given curve. Write the conic

$$\alpha y+\beta xy=y^2+\mu x^2+\nu x+\rho \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (1),$$

then differentiating four times and writing D for $\frac{d}{dx}$, we have, remembering that the four first differential coefficients of the two curves coincide,—

$$\alpha \mathrm{D}y+\beta \mathrm{D}(xy)=\mathrm{D}y^2+2\mu x+\nu \quad . \quad . \quad . \quad . \quad . \quad . \quad (2),$$

$$\alpha \mathrm{D}^2y+\beta \mathrm{D}^2(xy)=\mathrm{D}^2y^2+2\mu \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (3),$$

$$\alpha \mathrm{D}^3y+\beta \mathrm{D}^3(xy)=\mathrm{D}^3y^2 \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (4),$$

$$\alpha \mathrm{D}^4y+\beta \mathrm{D}^4(xy)=\mathrm{D}^4y^2 \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (5),$$

whence
$$\alpha=\frac{D^3y^2D^4(xy)-D^4y^2D^3(xy)}{D^3yD^4(xy)-D^4yD^3(xy)},$$

and
$$\beta=\frac{D^3y^2D^4y-D^4y^2D^3y}{D^3(xy)D^4y-D^4(xy)D^3y},$$

then μ, ν, ρ are found from (1), (2), (3), and the conic determined.

(5.) Let us now endeavour to show how the equation to the cubic with 9-pointic contact with a given curve is to be found.

Writing the cubic

$$ay^2x+bx^2y+cy^2+dy+exy=y^3+\mu x^3+\nu x^2+\rho x+\sigma,$$

we differentiate eight times and obtain five equations from which μ, ν, ρ, σ have disappeared.

$$aD^4(y^2x)+bD^4(x^2y)+cD^4y^2+dD^4y+eD^4(xy)=D^4y^3,$$

with four others obtained by substituting in this equation D^5, D^6, D^7, D^8 successively for D^4. Hence we shall have—

$$a.\begin{Bmatrix} D^4(y^2x), & D^4(x^2y), & D^4y^2, & D^4y, & D^4(xy) \\ D^5(y^2x), & D^5(x^2y), & D^5y^2, & D^5y, & D^5(xy) \\ D^6(y^2x), & D^6(x^2y), & D^6y^2, & D^6y, & D^6(xy) \\ D^7(y^2x), & D^7(x^2y), & D^7y^2, & D^7y, & D^7(xy) \\ D^8(y^2x), & D^8(x^2y), & D^8y^2, & D^8y, & D^8(xy) \end{Bmatrix}$$

$$=D^4y^3\begin{Bmatrix} D^5(x^2y), & D^5y^2, & D^5y, & D^5(xy) \\ D^6(x^2y), & D^6y^2, & D^6y, & D^6(xy) \\ D^7(x^2y), & D^7y^2, & D^7y, & D^7(xy) \\ D^8(x^2y), & D^8y^2, & D^8y, & D^8(xy) \end{Bmatrix}$$

$$+D^5y^3\begin{Bmatrix} D^4(x^2y), & D^4y^2, & D^4y, & D^4(xy) \\ D^6(x^2y), & D^6y^2, & D^6y, & D^6(xy) \\ D^7(x^2y), & D^7y^2, & D^7y, & D^7(xy) \\ D^8(x^2y), & D^8y^2, & D^8y, & D^8(xy) \end{Bmatrix}$$

$$+D^6y^3\begin{Bmatrix} D^4(x^2y), & D^4y^2, & D^4y, & D^4(xy) \\ D^5(x^2y), & D^5y^2, & D^5y, & D^5(xy) \\ D^7(x^2y), & D^7y^2, & D^7y, & D^7(xy) \\ D^8(x^2y), & D^8y^2, & D^8y, & D^8(xy) \end{Bmatrix}$$

$$+D^7y^3\begin{Bmatrix} D^4(x^2y), & D^4y^2, & D^4y, & D^4(xy) \\ D^5(x^2y), & D^5y^2, & D^5y, & D^5(xy) \\ D^6(x^2y), & D^6y^2, & D^6y, & D^6(xy) \\ D^8(x^2y), & D^8y^2, & D^8y, & D^8(xy) \end{Bmatrix}$$

$$+D^8y^3\left\{\begin{array}{llll} D^4(x^2y), & D^4y^2, & D^4y, & D^4(xy) \\ D^5(x^2y), & D^5y^2, & D^5y, & D^5(xy) \\ D^6(x^2y), & D^6y^2, & D^6y, & D^6(xy) \\ D^7(x^2y), & D^7y^2, & D^7y, & D^7(xy) \end{array}\right\}.$$

In the same way b, c, d, e are determined, and then μ, ν, ρ, σ are known from the third, second, first, and original equations.

(6.) In the same way we may proceed to find the 14-pointic contact of a curve of the fourth order. The coefficients will be expressed by series of determinants, each having eight rows and eight columns, divided by a determinant having nine rows and nine columns. And the same method will apply to the general case.

II. "Note on Mr. Russell's paper 'On certain Geometrical Theorems. No. 2.'" By William Spottiswoode, Pres. R.S. Received May 25, 1882.

If we apply Mr. Russell's formulæ to the determination of the sextactic points of a curve, we shall have, in addition to the equations (1)—(5), the following—

$$\alpha D^5y+\beta D^5(xy)=D^5y^2\,;$$

and by elimination of α and β from his equations (4) and (5), together with this latter, we shall obtain as the condition for a sextactic point—

$$\begin{array}{lll} D^3y, & D^3xy, & D^3y^2=0 \\ D^4y, & D^4xy, & D^4y^2, \\ D^5y, & D^5xy, & D^5y^2. \end{array} \quad \ldots\ldots\ldots \quad (A).$$

But

$$\begin{aligned} Dxy &= y \quad +xDy, \\ D^2xy &=2Dy \quad +xD^2y, \\ D^3xy &=3D^2y \quad +xD^3y, \\ D^4xy &=4D^3y \quad +xD^4y, \\ D^5xy &=5D^4y \quad +xD^5y, \\ Dy^2 &=2yDy, \\ D^2y^2 &=2yD^2y+\ 2(Dy)^2, \\ D^3y^2 &=2yD^3y+\ 6DyD^2y, \\ D^4y^2 &=2yD^4y+\ 8DyD^3y+\ 6(D^2y)^2, \\ D^5y^2 &=2yD^5y+10DyD^4y+20D^2yD^3y. \end{aligned}$$